APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,355	03/07/2005	Nobuhiro Nunoya	14321.67	4938

22913   7590   06/28/2007

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EXAMINER
STAFFORD, PATRICK

ART UNIT	PAPER NUMBER
2828	

MAIL DATE	DELIVERY MODE
06/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/527,355	NUNOYA ET AL.
	Examiner	**Art Unit**	
	Patrick Stafford	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>19 April 2007</u>.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,14-16 and 50-54* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,14-16 and 50-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claims 11, 13, 17-49 are cancelled. Claims 50-54 added.

Response to Arguments

Applicant's arguments filed 19 April 2007 have been fully considered but they are not

persuasive. Applicant has argued that the system of *Ikeda* would not be combined with the

systems of *Numai* or *Funabashi* because they are not oriented the same as *Ikeda*. However, even

though Numai and Funabashi do not explicitly teach the same orientation, it does not explicitly

teach it not being possible to be oriented in the same manner. Therefore, the combination of the

two systems is still possible and proper.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

Claim 1-7, 9-10, 14-16, 50-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Numai (U.S. Patent 6,501,776, hereafter '776) in view of Funabashi (U.S. Patent 6,580,740,

hereafter '740) and further in view of Ikeda et al (U.S. Patent 5,155,737, hereafter '737).

Claim 1: '776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light

guiding layer), having an effective refractive index whose temperature dependence differs from

that of the gain region and having no wavelength selectivity (col. 3, lines 3-15, active layer has

the positive refractive-index temperature coefficient, the light guiding layer has the negative

refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has

no gain (col. 4, lines 17-28, the distributed Bragg reflector).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by

a periodic perturbation with at least one of real and imaginary parts of a complex refractive

index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a

periodic perturbation with at least one of real and imaginary parts of a complex refractive index

is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The

selection of something based on its known suitability for its intended use has been held to

support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325

U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to use the gain region comprising a diffraction

grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of

the gain region being greater than 300 cm^{-1}. Ikeda '737 teaches a diffraction grating with a very

high coupling coefficient, greater than 300 cm^{-1} as suitable for semiconductor lasers. Therefore,

it would have been obvious to one of ordinary skill in the art at the time the invention was made

to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 2: '776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a material with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has no gain (col. 4, lines 17-28, the distributed Bragg reflector).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to use the gain region comprising a diffraction

grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of

the gain region being greater than 300 cm^{-1}. Ikeda '737 teaches a diffraction grating with a very

high coupling coefficient, greater than 300 cm^{-1} as suitable for semiconductor lasers. Therefore,

it would have been obvious to one of ordinary skill in the art at the time the invention was made

to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The

subject matter as a whole would have been obvious to one of ordinary skill in the art at the time

the invention was made to have selected the overlapping portion of the range disclosed by the

reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see

In re Malagari, 182 U.S.P.Q. 549.

Claim 3: '776 teaches a semiconductor laser comprising:

a gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light -

guiding layer), having a structure with an effective refractive index whose temperature

dependence differs from that of the gain region, and having no gain nor wavelength selectivity

(col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light

guiding layer has the negative refractive-index temperature coefficient); and

a reflecting region that reflects light propagated through the propagating region, and has

no gain (col. 4, lines 17-28, the distributed Bragg reflector).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. Ikeda '737 teaches a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 4: '776, '740 and '737 teach the semiconductor laser as claimed in claim 1. '776 teaches the reflection region has a diffraction grating with a periodic structure (col. 4, lines 17-28, the

distributed Bragg reflector). Distributed Bragg reflectors inherently have periodic structures

(Furuya U.S. Patent 4,464,762, col. 1, lines 17-23).

Claim 5: '776 teaches a semiconductor laser comprising:

a first gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light

guiding layer), having a material with an effective refractive index whose temperature

dependence differs from that of the gain region, and having no gain nor wavelength selectivity

(col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light

guiding layer has the negative refractive-index temperature coefficient); and

a second gain region optically coupled to the propagating region, and having wavelength

selectively (col. 6, lines 51-58 and col. 19, lines 20-29 and Fig. 12, parts 723).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by

a periodic perturbation with at least one of real and imaginary parts of a complex refractive

index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a

periodic perturbation with at least one of real and imaginary parts of a complex refractive index

is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The

selection of something based on its known suitability for its intended use has been held to

support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325

U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to use the gain region comprising a diffraction

grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the gain region being greater than 300 cm^{-1}. Ikeda '737 teaches a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1} as suitable for semiconductor lasers. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 6: '776 teaches a semiconductor laser comprising:

a first gain region having wavelength selectivity (col. 3, lines 24-28, the active layer);

a propagating region optically coupled to said gain region (col. 3, lines 27-28, the light guiding layer), having a structure with an effective refractive index whose temperature dependence differs from that of the gain region, and having no gain nor wavelength selectivity (col. 3, lines 3-15, active layer has the positive refractive-index temperature coefficient, the light guiding layer has the negative refractive-index temperature coefficient); and

a second gain region optically coupled to the propagating region, and having wavelength selectively (col. 6, lines 51-58 and col. 19, lines 20-29 and Fig. 12, parts 723).

'776 does not explicitly teach the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index. Funabashi '740 teaches the gain region comprising a diffraction grating formed by a periodic perturbation with at least one of real and imaginary parts of a complex refractive index

is suitable for the grating in a semiconductor laser with an active layer (col. 1, lines 26-41). The

selection of something based on its known suitability for its intended use has been held to

support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325

U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to use the gain region comprising a diffraction

grating formed by a periodic perturbation with at least one of real and imaginary parts of a

complex refractive index.

'776 and '740 do not explicitly teach the coupling coefficient of the diffraction grating of the

gain region being greater than 300 cm^{-1}. Ikeda '737 teaches a diffraction grating with a very

high coupling coefficient, greater than 300 cm^{-1} as suitable for semiconductor lasers. Therefore,

it would have been obvious to one of ordinary skill in the art at the time the invention was made

to use a diffraction grating with a very high coupling coefficient, greater than 300 cm^{-1}. The

subject matter as a whole would have been obvious to one of ordinary skill in the art at the time

the invention was made to have selected the overlapping portion of the range disclosed by the

reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see

In re Malagari, 182 U.S.P.Q. 549.

Claim 7: '776, '740 and '737 teach the semiconductor laser of claim 3. '776 teaches the

structure of the propagating region differs from a structure of the gain region in at least one of a

layer structure (col. 20, lines 19-24).

Claim 9: '776, '740 and '737 teach the semiconductor laser of claim 1. '776 teaches the

propagating region is composed of a material whose temperature differential coefficient of the

effective refractive index (col. 20, lines 57-63) is different from that of a semiconductor (col. 9, lines 11-18).

Claim 10: '776, '740 and '737 teach the semiconductor laser of claim 1. '776 teaches the propagating region is composed of a material whose temperature differential coefficient of the effective refractive index is negative (col. 3, lines 39-46).

Claim 14: '776, '740 and '737 teach the semiconductor laser of claim 1. '776 teaches the gain region (Fig. 15A, part 1023), the propagating region (Fig. 15A, part 1024), and the reflection region (Fig. 15A, part 1025) are stacked (col. 21, line 66-col. 22, line 15).

Claim 15: '776, '740 and '737 teach the semiconductor laser of claim 1. '776 teaches the gain region and the propagating region are coupled via optical path changing means (col. 7, lines 37-41).

Claim 16: '776, '740 and '737 teach the semiconductor laser of claim 1. '776 teaches the propagating region (Fig. 14A part 924) has a waveguide structure having an optical confinement structure on the upper (Fig. 14A part 921, the cladding layer) and lower portions (col. 21, lines 37-39).

Claims 50-54: Rejected for the same reason as claims 1-6 above.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Numai '776 in view of Funabashi '740 and Ikeda et al (U.S. Patent 5,155,737, hereafter '737) and further in view of Kirkby (U.S. Patent 4,583,227, hereafter '227).

'776, '740 and '737 teach the semiconductor laser of claim 1, as discussed above. They do not teach the absolute value of a product of a length of the propagating region and a

difference between a temperature differential coefficient of the effective refractive index of the

gain region and a temperature differential coefficient of the effective refractive index of the

propagating region is equal to or greater than 7.5×10^{-4} μm/K. Kirkby '227 teaches the absolute

value of a product of a length of the propagating region and a difference between a temperature

differential coefficient of the effective refractive index of the gain region and a temperature

differential coefficient of the effective refractive index of the propagating region is equal to or

greater than 7.5×10^{-4} μm/K is a suitable value for temperature compensating semiconductor

lasers (col. 7, lines 4-8). The selection of something based on its known suitability for its

intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co.

v. Interchemical Corp.,* 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to use the absolute

value of a product of a length of the propagating region and a difference between a temperature

differential coefficient of the effective refractive index of the gain region and a temperature

differential coefficient of the effective refractive index of the propagating region is equal to or

greater than 7.5×10^{-4} μm/K.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Numai '776 in view of

Funabashi '740 and Ikeda et al (U.S. Patent 5,155,737, hereafter '737) and further in view of

Kashyap (U.S. Patent 5,719,974, hereafter '794).

'776, '740 and '737 teach the semiconductor laser of claim 1, as discussed above. They

do not explicitly teach the length of the propagating region is determined such that a longitudinal

mode spacing determined by a sum of an effective length of the diffraction grating and a length

of the propagating region, is greater than a stop bandwidth of the diffraction grating. '794

teaches the length of the propagating region is determined such that a longitudinal mode spacing

determined by a sum of an effective length of the diffraction grating and a length of the

propagating region, is greater than a stop bandwidth of the diffraction grating (col. 8, line 24 and

col. 9, lines 2-5) as suitable values for the diffraction grating in a semiconductor laser. The

selection of something based on its known suitability for its intended use has been held to

support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.,* 325

U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to determine the length of the propagating region

such that a longitudinal mode spacing determined by a sum of an effective length of the

diffraction grating and a length of the propagating region, is greater than a stop bandwidth of the

diffraction grating.

Conclusion

1.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Patrick Stafford whose telephone number is (571) 270-1275. The

examiner can normally be reached on M-Th 7:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PJS

MINSUN OH HARVEY
PRIMARY EXAMINER